Sandy Beaches and Nearshore Soft Bottom Habitats

♦ *Facilitators*:

Steve Webster, Monterey Bay Aquarium

♦ *Rapporteurs*:

Kate Stanbury, Moss Landing Marine Labs

♦ *Participants*:

Andrew DeVogelaere, Monterey Bay National Marine Sanctuary
Jon Geller, Moss Landing Marine Labs
George Gray, California State Parks
Dane Hardin, Applied Marine Sciences
Stacy Kim, Moss Landing Marine Labs
Jim Nybakken, Moss Landing Marine Labs
John Oliver, Moss Landing Marine Labs
Bruce Richmond, United States Geological Survey
Tim Stanton, Naval Postgraduate School
Curt Storlazzi, University of California at Santa Cruz

♦ *Priority Issues*:

- Trawling Effects
- Watershed Impacts
- Climatic Change
- Beach Loss / Erosion
- Dredge Material Disposal
- Human Impacts on Beach Habitats
- Sewage Spills / Point Source Impacts
- Seafloor Cables
- Beach Cleanup

♦ *Characterization of Priority Questions*:

What are the physical and biological effects of trawl exclusion zones?
Parameters - Generate habitat maps with high resolution (.5-1m), identify mega-fauna, identify infauna, identify grain size distribution, total organic carbon, larval supply/recruitment, larval transport
Methods - Maps using sidescan sonar, Roxanne, mulitbeam, video, LIDAR, SHOALS; Megafauna using trawl, diving, video, ground truth, ROV; Infauna using box core (quantitative device); Grain size using cores; TOC using cores; Recruitment using nets, larval traps; Transport using benthic tripod to assess bottom currents
Spatial Scale - Shore to shelf break, good replication inside and outside zone, transport distance
Temporal Scale - Decades
Frequency - Minimum baseline habitat map of one area and adequate samples inside and out, Benthos: Annually and seasonally (oceanographic); Preferred replicated reserves

Existing Data/Programs - Nearshore habitat mapping (Kvitek, Greene, CDFG), Schlining spot prawn (MLML thesis), some Carmel Bay and Canyon

What are the impacts of trawling in deep water habitats (>1000m)?
Parameters - Generate habitat maps with high resolution (.5-1m), identify megafauna, identify infauna, identify grain size distribution, total organic carbon, larval supply/recruitment, larval transport
Methods - Maps using sidescan sonar, Roxanne, mulitbeam, video; Megafauna using trawl, video, ground truth, ROV; Infauna using box core (quantitative device); Grain size using cores; TOC using cores; Recruitment using nets, larval traps; Transport using benthic tripod to assess bottom currents
Spatial Scale - Deep water, size of exclusion zone dependant on fish life history, good replication
Temporal Scale - Decades
Frequency - Baseline habitat map of one area and adequate samples inside and out, and benthos annually and seasonally (oceanographic); Preferred replicated reserves
Existing Data/Programs - MCI data, Transect off San Francisco (1980s), Nybakken, Sablefish, Cailliet, MBARI ROV canyon video, GLORIA data (~100 m resolution)

What is the frequency and distribution of trawling activity?
Parameters - Where, when, historical, and current
Methods - CDFG records, NMFS interviews, observers
Spatial Scale - Throughout Sanctuary
Temporal Scale - Historic to present (all records available)
Frequency - Minimum once; Preferred annually
Existing Data/Programs - CDFG and NMFS reports
Additional Comments - Anticipate potential new nearshore fisheries and gather relevant information (e.g., sea cucumbers, urchins, surf perch, and impact of recreational fishing)

What are the sedimentary, biological, chemical inputs to the nearshore system from individual watersheds?
Parameters - TSS, bed load sediments, stream flow, microbiology (pathogens), water chemistry, persistent organic pollutants (POP), nutrients
Methods - Event driven sampling, standard water contaminant analysis
Spatial Scale - Every significant watershed
Temporal Scale - Minimum 5 years; Preferred decadal
Frequency - Minimum all major rain events, monthly during low flow periods
Existing Data/Programs - USGS water resources report
Additional Comments - Other sources then rivers exist (e.g., cliff erosion)

What are the ecological effects of the above inputs?
Parameters - Sediment chemistry, mineralogy sinks and budgets, microbiology, benthic community structure and function, bioaccumulation consequences to affected organisms, nutrient effects on community, physical disturbance of sinks
Methods - Standard techniques for sediment chemistry, mineralogy, and microbiology, culturing, staining, molecular (DNA probing), disturbance, sink and budgets, use Pb 210 for sedimentation

rate; No standard techniques for sediment budget, nutrient effects on community, isotopic analysis of C and N, infaunal physiology, bioaccumulation, standard and new innovative techniques
Spatial Scale - Best case scenario is all watersheds; Minimum of Salinas, Pajaro and San Lorenzo Rivers
Temporal Scale - Minimum once
Frequency - Seasonally (3x/year)
Existing Data/Programs - USGS water resources report
Additional Comments - Impacts to pelagic system are important, minimum would be to characterize structure but function would be preferred

What are the effects of long-term primary productivity changes on near-bottom and benthic communities?
Parameters - Primary productivity data, flux of organic material to the seafloor, benthic community structure
Methods - Settling traps, benthic flux chambers, stable isotopes, community structure using grabs samples and box cores
Spatial Scale - Upwelling filaments, shelf slope break, oxygen minimum zone, near shelf shallow
Temporal Scale – Minimum 1x/year following upwelling but preferred 3x/year in perpetuity
Frequency - Seasonally (3x/year)

What are the patterns of extreme storms cycles, waves, currents, runoff, and sediment transport?
Parameters - Establish baseline including nearshore morphology as related to habitat structure
Methods - Long-term storm records, hindcasting, buoy records, instrumentation such as CODAR, ship mounted, remote sensing (SeaWIFS), modeling, LIDAR, beach profiling, ROV, AUV mapping, small watercrafts with DGPS and fathometer
Spatial Scale - Hotspots include: southern Monterey Bay, Santa Cruz, Big Sur, MBNMS
Temporal Scale - decades
Frequency - High resolution, long-term time series (~10-min intervals)
Existing Data/Programs - NOAA, Scripps, MBARI, NPS, USGS, Griggs & Scorlazzi (storm frequency)
Additional Comments - Minimum would be to maintain current systems/devices/buoys in place

What is the impact of long-term fluctuations on ecological systems?
Parameters - Benthic community structure, changes in sediments and other physical characteristics, changes in benthic communities function and species interaction
Methods - Standard methods described above
Spatial Scale - Across depth transects stratified by habitat type, near major watersheds and upwelling centers
Temporal Scale - Once per year
Frequency - Minimum, establish baseline and annually, preferred in perpetuity